

**Internal distribution code:**

- (A) [ - ] Publication in OJ
- (B) [ - ] To Chairmen and Members
- (C) [ - ] To Chairmen
- (D) [ X ] No distribution

**Datasheet for the decision  
of 24 June 2020**

**Case Number:** T 2042/15 - 3.2.02

**Application Number:** 06781500.1

**Publication Number:** 2052685

**IPC:** A61B6/00

**Language of the proceedings:** EN

**Title of invention:**

METHOD OF CONTROLLING X-RAY DIAGNOSIS DEVICE

**Applicant:**

Toshiba Medical Systems Corporation

**Headword:**

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

Inventive step (no)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

Boards of Appeal of the  
European Patent Office  
Richard-Reitzner-Allee 8  
85540 Haar  
GERMANY  
Tel. +49 (0)89 2399-0  
Fax +49 (0)89 2399-4465

Case Number: T 2042/15 - 3.2.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.02**  
**of 24 June 2020**

**Appellant:** Toshiba Medical Systems Corporation  
(Applicant) 1385, Shimoishigami,  
Otawara-Shi, Tochigi-Ken 324-8550 (JP)

**Representative:** Kramer Barske Schmidtchen  
Patentanwälte PartG mbB  
European Patent Attorneys  
Landsberger Strasse 300  
80687 München (DE)

**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 9 June 2015  
refusing European patent application No.  
06781500.1 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** M. Alvazzi Delfrate  
**Members:** M. Stern  
N. Obrovski

## Summary of Facts and Submissions

I. The applicant lodged an appeal against the Examining Division's decision refusing European application No. 06 781 500.1. The application was refused on the grounds that, *inter alia*, the subject-matter of claim 1 of auxiliary request II lacked an inventive step over the following documents:

D1: EP-A-0 345 138

D4: US-A-6 789 941

II. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or the auxiliary request, both filed with the statement of grounds of appeal dated 5 October 2015.

III. The Board summoned the appellant to oral proceedings and provided its preliminary opinion in a communication accompanying the summons.

IV. The appellant filed a reply dated 28 April 2020. In a further letter dated 25 May 2020 it withdrew its request for oral proceedings, which were consequently cancelled on 26 May 2020.

V. Claim 1 of the **main request** reads as follows:

"1. A method for controlling an X-ray diagnostic apparatus comprising a tabletop (17) movably supported along a reference line; a floor-mounted rotary arm (54) mounted at one end on a floor rotatably about a substantially vertical rotation axis (Z1) and a driver (314) of the rotation of the floor-mounted

rotary arm (54); a stand (53) supported at the other end of the floor-mounted rotary arm (54) rotatably about a substantially vertical rotation axis (Z2) and a driver (313) of the rotation of the stand (53); a substantially C-shaped arm (51) slidably supported by the stand (53), wherein the stand (53) supports an arm holder (52) in such a manner as to be rotatable about a substantially C-arm horizontal rotation axis (Z3), and wherein the arm holder (52) supports the substantially C-shaped arm (51) in such a manner as to be slidably rotatable about a substantially horizontal sliding rotation axis (Z4) orthogonal to the C-arm horizontal rotation axis (Z3), and an arm-holder-rotation-mechanism driver (312) and a C-arm-slide-mechanism driver (311); an X-ray tube (1) supported at one end of the C-arm (51); an X-ray detector (2) supported at the other end of the C-arm rotatably about a shooting axis (Z5) passing through the X-ray focus of the X-ray tube (1) and the center of the detection surface and a driver (315-2) of the rotation of the X-ray detector (2); an X-ray limiting device provided to the X-ray tube (1) rotatably about the shooting axis (Z5) and a driver (315-1) of the rotation of the X-ray limiting device; and a controller (3, 10) for controlling the components of the apparatus, the method comprising the steps of:

supplying driving signals from the drivers (311, 312, 313, 314, 315-1, 315-2) serving as power source to motors of mechanisms supporting C-arm (51) under the control of a moving-mechanism drive controller (33) of a moving-mechanism driver (3) in response to control signals from a system controller (10) or operating signals from an operating section (9) of the X-ray diagnostic apparatus,

moving the X-ray tube (1) and the X-ray detector (2) linearly substantially in parallel with

the reference line by controlling the rotation of the floor-mounted rotary arm (54) and the rotation of the stand (53), and

maintaining the orientation of the image in a display screen by controlling the axial rotation of the X-ray detector (2) and the X-ray limiting device in synchronization with the rotation of the floor-mounted rotary arm (54) and the rotation of the stand (53) wherein rotating the X-ray limiting device together with the X-ray detector (2) is performed by controlling the driver (315-2) of the rotation of the X-ray limiting device."

VI. Claim 1 of the **auxiliary request** reads as claim 1 of the main request apart from the penultimate step, which reads as follows:

"moving the X-ray tube (1) and the X-ray detector (2) linearly substantially in parallel with the reference line by controlling the rotation of the floor-mounted rotary arm (54) and the rotation of the stand (53) by one-button operation or one action," [emphasis added].

VII. The appellant's arguments relevant for the present decision may be summarised as follows:

- The closest prior-art document D1 did not disclose a movable table, let alone a reference line along which the tabletop was movable. D1 did not disclose any rotation at the source side of the imaging system either. Only in Fig. 3 did D1 explicitly identify rotation for the detector 12. In contrast, Fig. 4 did not explicitly indicate any rotatability of elements attached to the arcuate member 13. While D1 did explicitly mention collimation, it did not in any way

address the issue of the potential need for rotation. This implied that the inventors in D1 had clearly identified a need to rotate the detector only and not the collimator. The silence regarding the collimator clearly pointed to an interaction that was not affected at the source side by the rotation. In contrast to the specific disclosure in D1, the inventors of the present application realised that in particular for the case of an X-ray limiting device being circular, there was no need to rotate the X-ray limiting device. The inventors further realised that the need to also rotate the X-ray limiting device applied for alternative shapes of the X-ray irradiation field, specifically asymmetric shapes such as a "rectangular" desired shape of the X-ray irradiation field. Distinguishing features (b) and (c) mentioned in the Board's communication were not derivable from document D4, in particular not from column 2, lines 11 to 18, a passage which was quite confusing. There was a clear synergetic effect between the missing features (a) to (c). In particular, the synergetic effect related to the advantages that space could easily be provided in particular for examination and medical surgery of the whole body in the presence of such an imaging system. Even when combining D1 and D4, such a synergetic effect was not achieved, so the subject-matter of claim 1 of the main request involved an inventive step.

- One-button operation or a single action, as defined in claim 1 of the auxiliary request, might, for example, result in movement in parallel with a reference line towards the legs of a patient positioned on the tabletop. None of the cited prior-art documents disclosed the additional feature or identified the advantage of having one-button operation for linear movements along the reference line. One-button

operation was more than a simple routine measure for the skilled person.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *The invention*

The application relates to a method for controlling an X-ray diagnostic apparatus, which, in essence, comprises the following:

- a floor-mounted rotary arm (54) mounted on the floor rotatably about a vertical rotation axis (Z1),
- a stand (53) supported at the other end of the floor-mounted rotary arm (54) rotatably about a second vertical rotation axis (Z2), and
- a C-arm supporting an X-ray tube (1) and an X-ray detector (2) which is rotatable about a shooting axis (Z5) passing through the X-ray focus of the X-ray tube (1) and the centre of the detection surface, an X-ray limiting device being provided to the X-ray tube (1) rotatably about the shooting axis (Z5).

The X-ray limiting device (or collimator), which is not shown in the figures, is provided to the X-ray tube. It forms the irradiation field into a desired shape such as a rectangle or a circle (page 9, lines 10 to 13). The C-arm of the apparatus has two additional horizontal rotational axes, Z3 and Z4.

The claimed method comprises, in essence, the steps of:



- moving the X-ray tube (1) and the X-ray detector (2) linearly substantially in parallel with a tabletop moving reference line by controlling the rotation of the floor-mounted rotary arm (54) and the rotation of the stand (53), and
- maintaining the orientation of the image on a display screen by controlling the axial rotation of the X-ray detector (2) and the X-ray limiting device in synchronization with the rotation of the floor-mounted rotary arm (54) and the rotation of the stand (53) wherein rotating the X-ray limiting device together with the X-ray detector (2) is performed by controlling the driver (315-2) of the rotation of the X-ray limiting device.

In other words, when the C-arm is displaced along the length of the tabletop by rotating the floor-mounted rotary arm (54) and the stand (53) about their respective vertical rotation axes (Z1 and Z2), the orientation of the X-ray detector changes too. To avoid the orientation of the image on the display also changing as a result, the X-ray detector and the X-ray limiting device are rotated about the shooting axis Z5 in synchronization with the rotations of the rotary arm and the stand (see page 17, lines 8 to 21; the similar passages in the paragraph spanning pages 18 and 19; the paragraph spanning pages 21 and 22; page 23, lines 8 to 19).

### 3. *Main request*

- 3.1 Claim 1 of the main request corresponds to claim 1 of auxiliary request II on which the decision under appeal is based.

3.2 Document D1, which is considered to constitute the closest prior art, discloses (Figures 1 and 4) an X-ray apparatus comprising a table (15), a floor-mounted rotating arm (24), a rotating stand (25) and a C-arm (13) supporting an X-ray source (11) and an X-ray detector (12). The different rotation axes disclosed in D1, i.e. axes 1 to 4 and axis RX, correspond to the rotation axes Z1 to Z5 in the present application as follows:

Z1 = axis 3  
Z2 = axis 4  
Z3 = axis 2  
Z4 = axis 1  
Z5 = axis RX

It is implicit that in an X-ray apparatus like that in D1, the rotations of the various elements, such as the floor-mounted rotating arm (24), the rotating stand (25) and the C-arm (13), will be effected by motors which are powered by driving signals from respective drivers in response to a controller. Hence, features (ii) mentioned in the appealed decision (under point 3.2.3) are in fact implicit in D1 and are therefore not considered to be distinguishing features.

D1 discloses the X-ray detector as being rotatable about the axis of the X-ray beam (axis RX) so as to maintain the same orientation of the images irrespective of the angular movements of the arm 24 and stand 25 about axes 3 and 4 (column 5, lines 17 to 21). D1 then briefly indicates that a collimator (19) may be associated with the X-ray source (11) (column 5, lines 24 to 26). D1 omits to say, however, how the collimator should be adjusted to the rotatable positions of the detector in order to maintain the

orientation of the images when the arm and the stand rotate.

In the Board's view, the skilled person understands a collimator to be a shutter that adjusts the extension of the X-ray field to match, inter alia, the shape or position of the detector. Collimation of the X-ray field into circular or rectangular shapes is also known to the skilled person.

3.3 D1 does not disclose the following features of claim 1:

- (a) the images are displayed on a display screen;
- (b) the tabletop is movable along a line ("reference line") which is substantially parallel to the one along which the X-ray tube and the X-ray detector are moved;
- (c) the X-ray limiting device is provided to the X-ray tube rotatably about the shooting axis by a rotation driver; and the orientation of the image on the display is maintained by rotating the X-ray detector and the X-ray limiting device about the shooting axis.

3.4 *Regarding feature (a)*

In X-ray imaging using isocentric scanning at multiple angles of incidence, as in D1 (column 1, lines 3 to 7), it is commonplace to display the images on a screen. While conceivable in principle, any alternative for presenting the X-ray images of multiple scans, such as on an X-ray film, is technically far-fetched. A screen for displaying successively scanned images is hence an entirely straightforward and obvious technical choice devoid of any inventive merit.

3.5 *Regarding feature (b)*

D1 discloses that the isocentre O may be moved along any trajectory in the plane (x, y) of the table (column 4, lines 40 to 47). As correctly pointed out by the appellant, however, D1 does not disclose that the tabletop is movable too. Nevertheless, it is well known to the skilled person that patient imaging requires the patient to be adequately positioned and, hence, displacement of the table carrying the patient. Enabling the table to move in various directions, in particular along the longitudinal table axis x'x (along which the isocentre O may be moved (Figure 4)), is a routine technical measure devoid of inventive merit.

3.6 *Regarding features (c)*

As explained under point 3.2 above, D1 discloses the X-ray detector as being rotatable about the axis of the X-ray beam (axis RX) so as to maintain the same orientation for all images irrespective of the angular movements of the arm 24 and stand 25 about the axes 3 and 4 (column 5, lines 17 to 21). D1 then briefly indicates that a collimator 19 may be associated with the X-ray source 11 (column 5, lines 24 to 26). A collimator is a shutter that adjusts the extension of the X-ray field to match, inter alia, the shape or position of the detector, with circular or rectangular shapes of the X-ray field being commonplace.

Although D1 omits to say how the collimator should be adjusted to successively rotated positions of the detector in order to maintain the orientation of the images, the answer to this question is immediately apparent to the skilled person: the collimator has to rotate together with the rotation of the detector.

Otherwise, if, for example, collimation were to create a field of view covering most or all of the area of the detector, X-ray radiation would fall outside the detector as soon as the detector is rotated from the original position, leading to a loss of diagnostic information (leading to a so-called spill-over of radiation).

Moreover, document D4 addresses and solves the same problem of compensating for the tilting of an X-ray image on a screen when a C-arm is rotated from one position to the next (column 2, lines 18 to 25). D4 provides a mechanical and an electronic solution, the former involving rotating the X-ray detector together with the collimator when a square X-ray field is used.

Hence, to maintain the same orientation of all images irrespective of the angular movements of the arm 24 and stand 25 about the axes 3 and 4 in D1, the skilled person will readily envisage features (c) and control "the axial rotation of the X-ray detector and the X-ray limiting device in synchronization with the rotation of the floor-mounted rotary arm and the rotation of the stand", as defined in claim 1.

- 3.7 The appellant argued that there was a clear synergetic effect between distinguishing features (a) to (c). The effect related to the advantage that having a screen-based imaging system meant space could easily be provided in particular for examination and medical surgery of the whole body.

The Board presumes that the appellant is suggesting that features (a) to (c) work together or cooperate to produce an effect, possibly an enhanced effect. The Board disagrees, however.

From the discussion above it is clear that the problem of maintaining the same orientation of all images irrespective of the angular movements of the arm 24 and stand 25 about the axes 3 and 4 in D1 is unrelated to which means are chosen for displaying the images. In other words, the problem of how the collimator is adjusted to successively rotated positions of the detector in order to maintain the orientation of the images is unrelated to choosing a screen (or any other means) for displaying the images. Moreover, the combination of distinguishing features (a) and (c) does not produce any further effect - let alone an enhanced effect - beyond the individual effects of each of said features mentioned above. Moreover, it is noted that, as indicated above, it was already known from D4 to provide features (c) in combination with a screen display, i.e. feature (a).

Furthermore, the problem of how the collimator is adjusted to successively rotated positions of the detector in order to maintain the orientation of the images (solved by features (c)) is clearly unrelated to the problem of adequately positioning the patient (solved by a movable patient table according to feature (b)). Likewise, the choice of a screen display (feature (a)) is entirely unrelated to the feature of a movable patient table (according to feature (b)).

The Board therefore concludes that the combination of distinguishing features (a) to (c) does not produce any further effect - let alone an enhanced effect - beyond the individual effects of each of said features mentioned above.

3.8 As a consequence, the subject-matter of claim 1 of the main request lacks an inventive step within the meaning of Article 56 EPC.

4. *Auxiliary request*

4.1 Claim 1 of the auxiliary request defines moving the X-ray tube and the X-ray detector linearly substantially in parallel with the reference line by controlling the rotation of the floor-mounted rotary arm and the rotation of the stand "*by one-button operation or one action*".

4.2 D1 does not explicitly disclose what command is needed to start the movement of the X-ray tube and the X-ray detector along a line in the horizontal plane (x, y) (column 4, lines 40 to 47).

It is obvious to the skilled person, however, that such movement would be controlled and carried out by the apparatus itself (i.e. its controller) rather than manually by an operator, for example. The operator would just need to give a certain (final) command - "one action" - to start the machine movement. Moreover, it is a routine technical measure to provide some sort of "button" to give this command.

4.3 Hence, the subject-matter of claim 1 of the auxiliary request lacks an inventive step within the meaning of Article 56 EPC.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



N. Schneider

M. Alvazzi Delfrate

Decision electronically authenticated